

I. PRELIMINARY MATERIALS

A. Project Abstract

Adaptation in water management is a greatly revered yet poorly understood goal and concept. The U.S. suffers from an “adaptation deficit” (Jacobs et al. 2010), but there is little comprehensive research on how to advance adaptation. A recent assessment of the state of adaptation research finds that case studies of how adaptation is *actually being delivered*, and barriers to effective delivery (e.g., information, capacity, institutions), is a critical missing component of existing adaptation research (Arnell 2010). We propose to address this gap both theoretically and methodologically in the Arizona-Sonora region of the U.S.-Mexico border. Our recent study of urban water vulnerability in southern Arizona (AZ) and northern Sonora has identified challenges for urban areas in the region (Wilder et al. 2010). In AZ, vulnerabilities include strong institutional capacity combined with relatively weak integration of climate science and continued reliance on sole-source supply (e.g., Colorado River water), driving a regional focus on desalination of seawater as a regional water solution. In Sonora, our study found limited adaptive capacity in water management institutions—a lack of integration of climate science into water planning and operations, and a lack of emphasis on both adaptive planning and conservation, as well as low water security in poor neighborhoods lacking access to the water network. The key research questions guiding this project include: what is the role of networks in governance and the implications for using climate knowledge; what are the most effective climate services to support efforts to adapt; and how can decision-support tools build institutional adaptive capacity. We will examine these questions using interactive stakeholder workshops, online surveys, semi-structured interviews, webinars, and annual scientist-stakeholder symposia. Project outputs will include stakeholder workshops, symposia, presentation of results at professional meetings, papers in peer-reviewed journals, workshop and symposia reports, annual webinars, quarterly production of the Border Climate Summary, a project website, and formal project evaluation.

B. Research Objective

The research has applied and theoretical significance for the AZ-Sonora region and arid and transboundary contexts generally. Our objectives include: (1) advance the theoretical understanding of adaptation in the arid, transboundary U.S.-Mexico context, with implications for other arid and binational regions; (2) further the effective practice of adaptive water management by assessing supply- and demand-management strategies and governance arrangements that build or reduce adaptive capacity within the study area and related contexts; (3) foster increased understanding of how climate knowledge and products (e.g., forecasts, projections) can be effectively used in decision-making and water governance operations and planning and to enhance communication with target stakeholders; and (4) assess, adapt, and develop decision-support tools that promote adaptive urban water management in the AZ-Sonora region, with applicability to other regions.

C. Approach

Research activities (1-4) are being carried out in our four study sites. The research team is organized into thematic and regional groups with multidisciplinary expertise in each one. A team leader is identified for each activity. Some activities (e.g., literature review, communicating climate science, pilot development

of adaptive capacity index, and evaluation) are cross-project activities. Project co-PI's and research assistants meet regularly to coordinate project activities and outputs.

D. Description of any matching funds/activities used in this project

Please refer to Grants section at the end of the document for details on leveraged grants.

Sponsor / Award / Total amt. (\$)	CSI-affiliated PIs	Dates	% applied	Amount (\$)
NOAA / Adapting to Climate Variability, Thresholds, and Extremes in the Southwest: The Climate Assessment for the Southwest (CLIMAS) / \$3,474,906	M. Wilder, G. Garfin	2012-17	10	347,490
USGS / Climate Assessment, Adaptation Synthesis and Research Needs for the Southwest / \$49,996	G. Garfin	2011-12	50	24,998
USGS / Climate Change Vulnerabilities and Adaptation Strategies to Wildfire in the Southwestern US / \$149,760	G. Garfin	2012-14	5	7,488
NOAA / Local Assessment of Drought Impacts and Climate Change Adaptation / \$68,410	G. Garfin	2012-13	50	34,205
U.S. Dept. of Defense / Climate Chg. Impacts and Adaptation on SW DoD Facilities / \$1,227,792	G. Garfin	2012-15	15	184,200
Lloyd's Register Foundation, UK, via Univ. of the West of England / Water Security Network for the Arid Americas / \$1,158,173	R. Varady C. Scott	2013-18	20	231,634
Inter-American Institute for Global Change Research (IAI) via Pontificia Universidad Catolica de Chile / Innovative Science and Influential Policy Dialogues for Water Security in the Arid Americas / \$216,000	C. Scott, R. Varady	2013-16	50	108,000
Fulbright Scholar Award. Fishing at the edge of extinction: Vaquita conservation in the Upper Gulf of California / ≈\$14,000 UA Bureau Applied Res. Anth. (BARA), 0.25 FTE GRA / \$6,500	M. Vásquez-León.	2012-2013	50	10,250
Inter-American Institute for Global Change Research (IAI) / Water security in	C. Scott, R. Varady	2012-14	50	152,000

Americas Networking grant / **\$304,000**

IAI / Phase 2 Information Flows: Use of Climate Diagnostics in W. North Amer. / \$119,700	C. Scott, R. Varady	2010-11	50	59,900
NSF Coupled Natural Human Syst. / Riparian Resilience / \$1,400,000	C. Scott	2010-15	5	70,000
U.S. Dept. Interior & U. of Ariz. Water Sustain. Prog. / \$168,810	C. Scott	2010-11	5	8,400
Udall Foundation / Coop. Agreement FY 2011 & FY 2012 / \$657,500	R. Varady	2011-12	10	65,700
Udall Foundation /Coop. Agreement FY 2013-2014. \$285,500. Co-PI with S. Cornell; 50 pct.	R. Varady	2013-14	10	28,550
Udall Foundation /Coop. Agreement FY 2013-2014. \$268,000. Co-PI with S. Cornell; 50 pct.	R. Varady	2014-15	10	26,800
French CNRS / Joint International Unit on Water, Envir., Policy / \$95,000	R. Varady	2008-11	10	9,500

As detailed in the table above and in the Grants section at the end of this document, we have a total of 15 additional grants leveraging an estimated **\$1,369,115** in additional funding (some of these funds extending beyond the term of the current award) to help support our NOAA CSI project activities.

ESTIMATED TOTAL LEVERAGED AMOUNT: **\$1,369,115**

II. ACCOMPLISHMENTS

A. Project timeline and tasks accomplished.

2012 - 2013

Sept. 1 – Dec. 31, 2012

Drs. Margaret Wilder and Karl Flessa hired one new graduate research assistant (Carrie Presnall) to review Lower Colorado River Multispecies Conservation Plan and begin work on interview protocol for delta adaptive capacity research.

Under the direction of Dr. Gregg Garfin, Dr. Adrian Quijada conducted eight Transborder Webinars in our series (see list below).

Under the direction of Dr. Gregg Garfin, Dr. Julie Brugger, continued fieldwork on Tucson case study, interviewing members (past and present) of citizens' water advisory committee (CWAC) to the local water utility, Tucson Water, as well as city council members and Tucson Water managers. The focus of the interviews was the role played by CWAC's in contributing to adaptive capacity in arid, urban areas.

Continued fieldwork in the Upper Gulf of California (detailed in January-June 2013 section).

In 2012, we published two editions of our online binational and bilingual climate newsletter, *Transborder Climate: Adaptation without Boundaries*. The newsletter is distributed to stakeholders who ask to subscribe and provides timely and regionally specific climate information and short feature articles for the Arizona/Sonora region. The newsletter is also online: <http://www.climas.arizona.edu/outlooks/tbc>

Jan. 1 – June 30, 2013

Continued biweekly (partial or full) research team meetings

Updated our project website (see <http://www.udallcenter.arizona.edu/csi/>)

Participated in media interviews.

In 2013, we published two editions of our online binational and bilingual climate newsletter, *Transborder Climate: Adaptation without Boundaries*. The newsletter is distributed to stakeholders who ask to subscribe and provides timely and regionally specific climate information and short feature articles for the Arizona/Sonora region. (see <http://www.climas.arizona.edu/outlooks/tbc>)

Drs. Margaret Wilder hired Research Analyst to conduct interviews to assess adaptive capacity among water managers in the Colorado River Delta region (this position replaced the previous student RA position; Carrie Presnall, an MS in Natural Resources, Ecology and Rangeland Management with expertise in the Colorado River Delta, was hired into the new position). Under Margaret Wilder's direction, we finalized the interview protocol, and conducted a small number of pilot interviews. After minor revision to the interview protocol, Carrie began conducting in-depth interviews with stakeholders from NGOs, universities, and local, state and federal agencies involved in water governance in the Colorado River Delta.

Dr. Gregg Garfin, with Dr. Adrian Quijada, conducted six Transborder Webinars in our series (see list below). In addition, we were asked by a new stakeholder group—NextGen Sonoran Desert Researchers—to cooperate with them in offering a webinar series based on Arizona-Sonora research by young, graduate-level scholars. To this end, we provided training and use of the webinar series for the NextGen group. Dr. Garfin and Dr. Quijada wrote and produced four editions of our online binational and bilingual climate newsletter, *Transborder Climate: Adaptation without Boundaries*, and distributed them to our stakeholder mailing list. (see <http://www.climas.arizona.edu/outlooks/tbc>)

Dr. Julie Brugger, under the direction of Dr. Gregg Garfin, conducted twenty-two semi-structured interviews with Citizens' Water Advisory Committee (CWAC) members (7 current and 1 former); Tucson Water staff (4 current and 5 former); and City Council members (4 members and 1 staff). Interviews were transcribed and the textual data was analyzed using a qualitative, mixed inductive/deductive grounded theory approach (Strauss and Corbin 1998). Dr. Brugger also conducted participant observation at meetings and in a tour of Tucson Water facilities.

In 2012-2013, Dr. Marcela Vásquez-León and research assistant Sasha Marley conducted a total of seven multiple-day fieldwork trips in Delta/Upper Gulf. The goal was to test and implement the survey instrument and create a video documentary. They completed a total of 29 in-depth interviews with institutional representatives and fisheries and agricultural resource users around adaptive capacity. Seventy surveys were completed by fishers and farmers in Santa Clara, San Felipe, and Mexicali Valley.

Dr. Laura López-Hoffman organized a January 11-12 workshop, *Transboundary Water Resources*

Governance and Riparian Areas: Theories, Methods and Applications, with European researchers from the Riparia project on issues relating to transboundary riparian resource management in different global contexts. Several members of the NOAA CSI research team presented U.S.-Mexico border case studies from the NOAA CSI project, including Wilder, Varady, Garfin, Vásquez-León, Flessa, and López-Hoffman. Researchers shared their research findings, discussed methodological approaches, and made plans for a special journal issue on transboundary water management.

Dr. Margaret Wilder requested a second, one-year, no-cost extension on the NOAA CSI grant to: 1) complete the fieldwork in the Delta study site; 2) analyze the field data for each site and compile overall findings regarding institutional adaptive capacity; 3) write a final report; 4) develop outputs including articles and presentations; and 5) plan and sponsor an adaptive capacity (held Oct. 1-3, 2014) with other regional teams, toward the goal of developing a pilot adaptive capacity index.

July 1, 2013 – June 30, 2014

A principal project activity during the summer months of 2014 was the organization of an international workshop called: Metrics and Measurement: Assessment of Institutional Adaptive Capacity and Water Security in the Arid Americas. The workshop was co-sponsored by the Inter-American Institute for Global Change Research (IAI) project and the Lloyd's Register Project, both at the Udall Center for Studies in Public Policy. Twenty-seven climate and water researchers from the U.S., Chile, Argentina, Peru, and Mexico participated in the two day workshop held October 1-3, 2014 in Tucson at the University of Arizona. The focus of the workshop was to advance the development of an index or metric to measure the adaptive capacity of water governance institutions in arid regions. Workshop participants are collaborating on a special journal issue (under consideration) and a synthesis article.

Updated our project website (see <http://www.udallcenter.arizona.edu/csi/>)

Participated in media interviews

Under the direction of Dr. Margaret Wilder, research analyst, Carrie Presnall conducted 22 in-depth interviews to assess adaptive capacity among water managers in the Colorado River Delta region. Interviewees included key informants from NGOs, universities, and local, state and federal agencies involved in water governance in the Colorado River Delta. Carrie transcribed and analyzed all interviews. To validate the analysis, Carrie and Dr. Wilder worked with a third researcher, Robert Merideth to analyze the data. The research team is writing the results in a report on institutional adaptive capacity and developing an article for submission to a peer-reviewed journal.

Dr. Julie Brugger, under the direction of Dr. Gregg Garfin, analyzed data from 22 interviews with Citizens' Water Advisory Committee (CWAC) members, Tucson Water staff, and City Council members. Dr. Brugger wrote a white paper on the study, and has just completed the first draft of a paper to be submitted to Journal of the American Water Resources Association.

PROJECT SUMMARY: OUTPUTS AND RESULTS

2013-2014 Summary

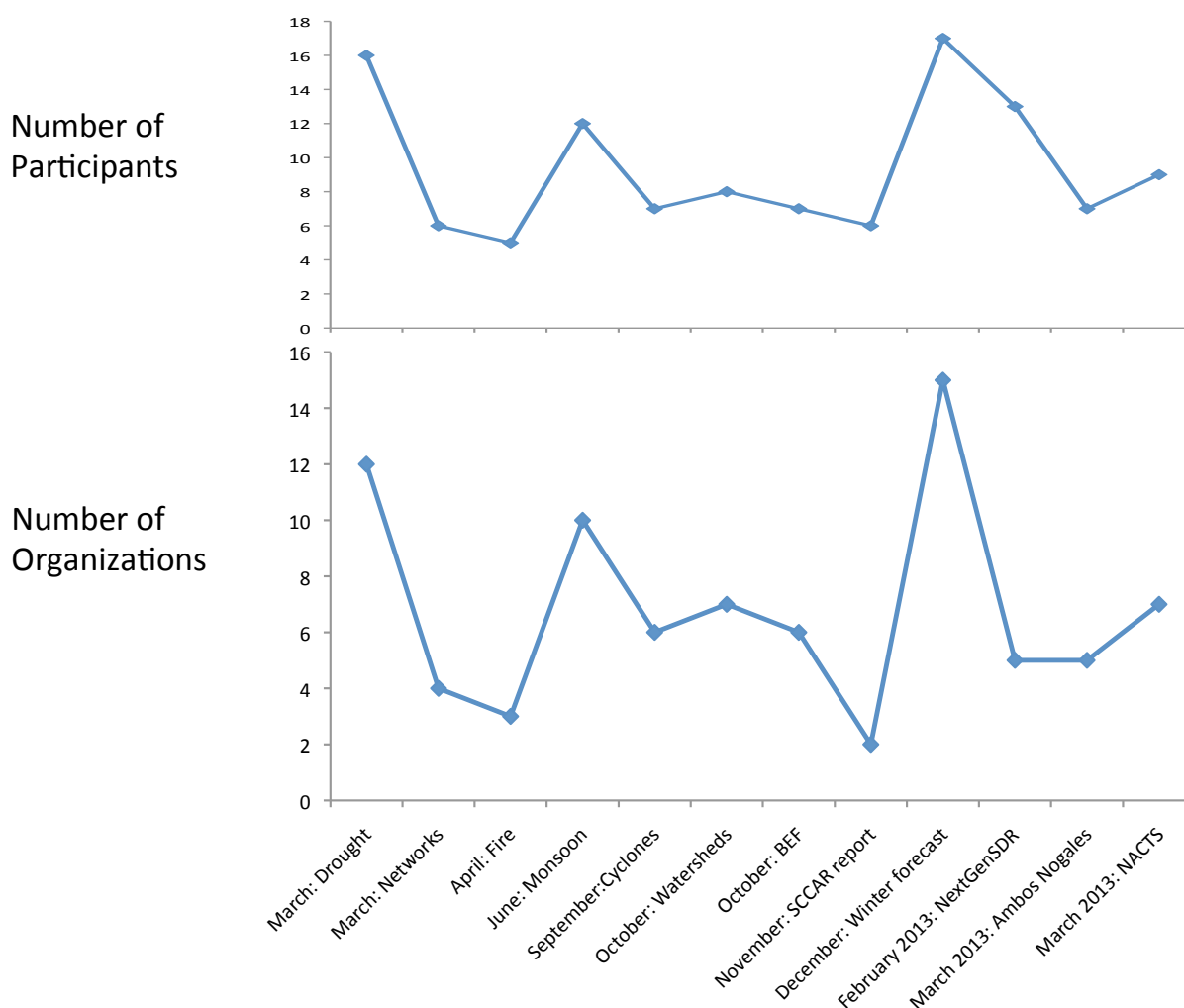
The third year of this project has been productive and fruitful in terms of our interactions with multiple and diverse stakeholders, focusing and carrying out fieldwork in Tucson, the Colorado River Delta, and the Upper Gulf of California, and completing major project activities. With the one-year, no-cost extension of the project, we have 1) completed the fieldwork in the Delta study site; 2) analyzed the field

data for each site and compile overall findings regarding institutional adaptive capacity; 3) written a final report; 4) developed outputs including articles and presentations. We are in the process of meeting our 5th goal of planning and sponsoring an adaptive capacity workshop/writeshop with other regional teams. In October 2014, we will meet and work to discuss advancements in developing a pilot adaptive capacity index.

By April, 2014, we completed fieldwork in four study sites, including Tucson, Hermosillo, the Upper Gulf of California, and the Colorado River Delta.

Over the past two years, we conducted a total of 14 Transborder Webinars in our webinar series, involving 23 expert scientists/speakers from institutions including the National Drought Mitigation Center, U.S. Bureau of Reclamation, National Weather Service, and the U.S. Geological Survey, among others, in the United States; and Mexico's National Weather Service (Servicio Meteorológico Nacional), Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (CICESE), and National Autonomous University of Mexico (UNAM), from Mexico. We developed an updated U.S.-Mexico border webinar participation listserv, and distributed announcements through collaborating organizations, including CLIMAS, Universidad de Sonora, Colegio de la Frontera Norte, CICESE, and the Department of Interior's Desert Landscape Conservation Cooperative. The graphs below represent stakeholder participation in our webinars. The data indicate that webinars on monsoons and forecasts garnered the highest participation by stakeholders. A full listing of 2012-2013 Webinar speakers and topics follows.

Webinar Participation 2012-2013 (through March 2013)



Webinars of the Transborder Climate Webinar Series 2012-2013

Podcasts accessible at our channel on YouTube: <https://www.youtube.com/user/ClimaTransfronterizo>

Date: 04/12/2013

Topic: US SOUTHWEST DROUGHT AND SEASONAL FORECAST IN NORTHERN MEXICO: IMPLICATIONS FOR THE BORDER REGION.

Bradfield Lyon¹ & Martín Ibarra Ochoa². ¹Climate Program International Research Institute for Climate and Society The Earth Institute, Columbia University. ²Servicio Meteorológico Nacional, Comisión Nacional del Agua (CONAGUA), Mexico.

Date: 03/11/2013

Topic: THE NORTH AMERICAN CENTER FOR TRANSBORDER STUDIES (NACTS)

D. Rick Van Schoik¹ & Carlos de la Parra². ¹The North American Center for Transborder Studies (NACTS), Arizona State University. ²Department of Urban and Environmental Studies, El Colegio de la Frontera Norte (COLEF)

Date: 03/08/2013

Topic: SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS) IN AMBOS NOGALES

Francisco Lara-Valencia & Gabriel Diaz. School of Transborder Studies & School of Architecture and Landscape Architecture, Arizona State University.

Date: 02/15/2013

Topic: CLIMATE CHALLENGES FOR THE NEXT GENERATION OF SONORAN DESERT RESEARCHERS

Ben Wilder¹, Lucero Radonic², Adrián Munguía³. ¹University of California, Riverside. ² School of Anthropology, University of Arizona. ³School of Natural Resources, University of Arizona

Date: 12/07/2012

Topic: TRANSBORDER WINTER FORECAST FOR MEXICO

Martín Ibarra Ochoa. Servicio Meteorológico Nacional, Comisión Nacional del Agua (CONAGUA-SMN), Mexico

Date: 11/12/2012

Topic: WATERSHED-MANAGEMENT AND ECOSYSTEM SERVICES IN TRANSBOUNDARY ENVIRONMENTS

1. *Watershed management under climate change in cross-border environments*

Laura Norman. U.S. Geological Survey.

2. *Ecosystem services across borders: a framework for transboundary conservation*

Laura López Hoffman. School of Natural Resources and the Environment and the Udall Center for Public Policy Studies, University of Arizona.

Date: 11/12/2012

Topic: WATERSHED-MANAGEMENT AND ECOSYSTEM SERVICES IN TRANSBOUNDARY ENVIRONMENTS

1. *Watershed management under climate change in cross-border environments*

Laura Norman. U.S. Geological Survey.

2. *Ecosystem services across borders: a framework for transboundary conservation*

Laura López Hoffman. School of Natural Resources and the Environment and the Udall Center for Public Policy Studies, University of Arizona.

Date: 11/09/2012

Topic: SOUTHWEST CLIMATE CHANGE ASSESSMENT REPORT: IMPACTS OF FUTURE CLIMATE CHANGE IN THE SOUTHWEST ON BORDER COMMUNITIES

Margaret Wilder & Gregg Garfin. School of Geography and Development & Udall Center for Studies in Public Policy, University of Arizona.

Date: 09/06/2012

Topic: CYCLONE SEASONAL FORECASTS

1. *Hurricane track forecast for the Eastern Pacific and Gulf of California*

Luis M. Farfán. Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (CICESE).

2. *The Gulf of Mexico and Atlantic Basin climatology of hurricanes*

Barry D. Keim. Louisiana State Climatologist, and Graduate Director, Department of Geography and Anthropology, Louisiana State University

Date: 04/30/2012

Topic: DROUGHT RISK MANAGEMENT AND MONSOON SEASON. April 30, 2012

1. *Use of climate information for drought risk management in Mexico*

Carolina Neri. Instituto de Geografía, Universidad Nacional Autónoma de México

2. *Introduction to the Monsoon season in the US Southwest*

John J Brost. NOAA National Weather Service Tucson Arizona

Date: 03/30/2012

Topic: ORGANIZATION NETWORKS

1. *Network On Hydrometeorological and Climatic Related Disasters (REDESClim)*

Tereza Cavazos. Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Baja California, Mexico.

2. *The Desert Landscape Conservation Cooperative (DESERT LCC)*

Jeremey J. Mikrut. U.S. Bureau of Reclamation-Desert Landscape Conservation Cooperative.

Date: 03/05/2012

Topic: DROUGHT IN THE BORDER REGION

1. *U.S. Drought Recap: 2011-2012*

Mark D Svoboda. Monitoring Program Area Leader, National Drought Mitigation Center (NDMC), University of Nebraska-Lincoln, USA

2. *Summary Of Drought In Northern Mexico*

Martin Ibarra Ochoa. Servicio Meteorológico Nacional, Comisión Nacional del Agua (CONAGUA-SMN), Mexico.

Publications (please refer to full appended list)

We have 72 articles or other publications in print to date relating to this project, and 8 in review or in press at this time. Journals include *Global Environmental Change*, *Environmental Science and Policy*, *Environment*, the *Annals of the Association of American Geographers*, *Geoforum*, and others. Our team members played a lead role in the National Climate Assessment's Southwest Climate Assessment. Gregg Garfin was Editor-in-Chief of the 420-page comprehensive assessment. Nicolás Pineda and Christopher Scott both have edited books published. Our research team made 106 presentations at local, regional, national, and international meetings.

STATUS	YEAR	SCHOLARLY	OTHER	TOTAL
In press or in review	2014	14		14
	2014	6		6
In print	2013	22	2	24
	2012	14	9	23
	2011	12	7	19
Total in print		54	18	72

Scholarly Presentations (please refer to full appended list)

	U.S. mtgs.	International mtgs.
2014	20	6
2013	19	5
2012	7	20
2011	9	19
Total	55	51
GRAND TOTAL		106

LIST OF OUTPUTS

Resulting from

MANAGING DEMAND AND RETHINKING SUPPLY: Adaptation, Conservation, and Planning in the Drought-prone Southwestern United States and Northwest Mexico

Supported by the National Oceanic and Atmospheric Administration Climate and Societal Interactions Program-Water Program NOAA/CSI Award # NA11OAR4310143 2011-2013

and

University of Arizona (UA)

June 2014

Margaret Wilder PI (UA, Udall Center/Latin American Studies/Geography) Robert Varady Co-PI (UA, Udall Center) Gregg Garfin Co-PI (UA, Institute of the Environment)

Collaborating Scientists

George Frisvold (Agriculture and Resource Economics, UA); Laura López-Hoffman (School of Natural Resources and the Environment and Udall Center, UA); Christopher Scott (Udall Center and School of Geography and Development, UA), Marcela Vásquez-León (BARA and Latin American Studies, UA); Gigi Owen, Staff Social Scientist (Climate Assessment for the Southwest Program, UA).

Consultants:

Luís Brito-Castillo (Meteorology, Northwest Center for Biological Research— Mexico), Francisco Lara Valencia (Urban Planning and Geography, Arizona State University); Maria Carmen Lemos (University of Michigan, Great Lakes RISA); Bradfield Lyon (Climate Program, International Research Institute for Climate and Society); Laura Norman (U.S. Geological Survey, Tucson Regional Office); Nicolás Pineda (Political Science and Public Policy, El Colegio de Sonora—Mexico), Patricia Romero-Lankao (Climate Science & Applications Program, National Center for Atmospheric Research, Boulder).

Research Associates

Julie Brugger, Carrie Presnall, and Adrian Quijada

Graduate Research Associates:

Sasha Marley (UA, Anthropology)

Media

Newsletters and Newspaper Articles

Browning-Aiken, A., **C. A. Scott, R. G. Varady**, S. B. Megdal. 2011. Cooperation for transboundary water management. *INBO* (International Network of Basin Organizations) *Newsletter*. N° 19: 20.

Quijada Mascareñas, A. and G. Garfin. 2012. *Transborder Climate: Adaptation Without Borders*. Climate Assessment for the Southwest. (Archive - <http://www.climas.arizona.edu/outlooks/tbc>).

“New Report Puts Hard Facts in the Hands of Water Policymakers.”
Interviews with **R. Varady** and **M. Wilder**. *Tucson Weekly*, May 3, 2012

“Team Identifies Water Vulnerability in Border Region.”
Interview with **M. Wilder**. *UA (University of Arizona) News*, April 17, 2012

“Water Vulnerability Plagues US Border Region.”
Article on SARP/IAI/CLIMAS case studies of water and climate vulnerability.
Western Farm Press, April 23, 2012

Wilder, M. “Highway shut in Sonora water dispute,” column by Tim Steller. *Arizona Daily Star* June 21, 2013.

Radio

Radio Program “La conversada.” Theme: “Hermosillo and climate change”. Radio Sonora. Hermosillo, Sonora, 5 de agosto de 2011.

Television

New Study of the Border Region Takes a Look at Water
Interview with **M. Wilder, R. Varady, and G. Garfin**.
Arizona Illustrated (KUAT-TV), May 10, 2012

Video/Multi-Media

Vásquez-León, M. (Director) and Daniel Duncan (Producer) 2013. Fishing at the edge of extinction: Community perspectives on Vaquita conservation. 8 min. HD Documentary. Bureau of Applied Research in Anthropology.

Publications by the NOAA-SARP Research Team, 2011-2014

In Review, In Press, and/or Forthcoming

Andersen, S.M., **C.A. Scott**. 2014. Editorial. *Desenvolvimento e Meio Ambiente* 30: 5-6.

Aureli, A., J. Ganoulis, **R. G. Varady**, S. B. Megdal, J. van der Gun, G.-J. Nijsten, K. Conti, and A. Merla. 2015 (forthcoming). Addressing the groundwater governance challenge (Chapter 5), *Water Governance for the 21st Century*, ed. by I. Buchan. Springer.

Brugger, J., G. Garfin, M. Wilder, R. Varady. In preparation. Enhancing adaptive capacity in municipal water supply management through social learning: A case study of the Tucson Citizens' Water Advisory Committee. *Ecology and Society*.

Carbone, G., DeGaetano, A., Dow, K., Fowler, J., **Garfin, G.M.**, Hartmann, H., Lay, E., & Rhee, J. (2015). *Challenges, pitfalls, and lessons learned in developing a decision-support tool*. In: A. Parris, G. Garfin, R. Meyer, and K. Dow (eds.), *Climate in Context*. Chichester, West Sussex: Wiley-Blackwell. (in review)

Curl, K., C. Neri, **C.A. Scott**. 2015. Drought and water scarcity: discourses and competing water demands in the context of climate change in arid Sonora, Mexico. In D. Stucker and E. Lopez-Gunn (eds.) *Adaptation to Climate Change through Water Resources Management: Capacity, Equity, and Sustainability*. Earthscan, London, pp. 21-42.

Garfin, G., T. Brown, T. Wordell, and E. Delgado. 2015. The Making of the *National Seasonal Wildfire Outlooks*. In: A. Parris, G. Garfin, R. Meyer, and K. Dow (eds.), *Climate in Context*. Chichester, West Sussex: Wiley-Blackwell.

Garfin, G., C. Carrillo, S. Reeder, L. Ethen, S. Petersen. In preparation. Projected Temperature and Precipitation Extremes for Tucson, Arizona: Using Stakeholder-Defined Criteria for Adaptation Planning. *Climate* (special issue - Regional Climate Models and their use for Adaptation Planning. Announcement -- http://www.mdpi.com/journal/climate/special_issues/regional_climate_model.)

Garfin, G., M. Finucane, A. Luers, E. Shea, A. Parris, E. Cloyd, and P. Fleming. In preparation. Partnerships and opportunities for managing risk. *Climatic Change* (special issue – Lessons from the Third National Climate Assessment).

Megdal, S. B., A. K. Gerlak, **R. G. Varady**, and L.-Y. Huang. 2015. Groundwater governance in the United States: Common priorities and challenges. *Groundwater* 52, 1: 1-8.

Parris, A., **G. Garfin**, R. Meyer and K. Dow (eds.) *Climate in Context*. Wiley & Sons. (Book contract accepted; 90% of chapters in near-final form).

Pineda-Pablos, N., A. N. Lutz Ley, J. L. Moreno Vázquez, and A. Salazar Adams, (In review). Derechos de agua y gestión por cuencas en México. El caso del río Sonora. *Espiral* (Universidad

de Guadalajara).

Scott, C.A. 2014. Eletricidade para o bombeamento de água subterrânea: limitações e oportunidades para respostas adaptativas às mudanças climáticas. *Desenvolvimento e Meio Ambiente* 30: 45-57.

Scott, C.A. 2014 in press. Eletricidade para o bombeamento de água subterrânea: limitações e oportunidades para respostas adaptativas às mudanças climáticas. *Desenvolvimento e Meio Ambiente* (translated version in the Portuguese of the following open-access article): **Scott, C.A.** 2013. Electricity for groundwater use: constraints and opportunities for adaptive response to climate change. *Environmental Research Letters* 8 (2013) 035005, doi: 10.1088/1748-9326/8/3/035005.

Sugg, Z., **R. G. Varady**, and A. K. Gerlak. 2014 (in submission). Resource challenges, ownership, and regulation in transboundary groundwater governance: Reflections on a survey of global and regional experts on the Guaraní Aquifer System. *Water International*.

2014 Publications

Díaz-Caravantes, R. E., & **Wilder, M.** (2014). Water, Cities and Peri-urban Communities: Geographies of Power in the Context of Drought in Northwest Mexico. *Water Alternatives*, 7(3).

Pineda Pablos, N., R. de Grenade, R. G. Varady, C. A. Scott, M. O. Wilder, A. Salazar Adams. 2014. Red Internacional de Seguridad Hídrica: Colaboración para investigar la gestión adaptativa al cambio climático en el Desierto de Sonora (The International Water Security Network collaboration to integrate research with adaptive management under climate change in the Sonoran Desert). *Agua y Saneamiento* 56 (Sept.-Oct.): 87-88.

Thapa, B., **R. G. Varady, C. A. Scott.** 2014. Measuring water security: An assessment of the 2013 Asian Development Bank Outlook National Water Security Index. *Environmental Scientist* 24, 3: 36-42.

Scott, C.A., B. de Gouvello (eds.). 2014. The Future of Public Water Governance: Has Water Privatization Peaked? Routledge, London, 192 p.
<http://www.routledge.com/books/details/9780415713139/>

Scott C.A., S. Vicuña, I. Blanco-Gutiérrez, F. Meza, C. Varela-Ortega. 2014. Irrigation efficiency and water-policy implications for river-basin resilience. *Hydrology and Earth System Sciences* 18: 1339–1348, doi: 10.5194/hess-18-1339-2014.

Varady, R. G., A. K. Gerlak, and E. D. McGovern. 2014. Hydrosolidarity and its place in international water diplomacy. In *Hydro Diplomacy: Sharing Water Across Borders*, ed. by G. Pangare. Bangkok: IUCN. pp. 23-31

2013 Publications

- Apel, M., A. Mostafa, B. Brandau, and **G. Garfin**. 2013. [Externships in Sustainability Program as an Outreach Tool for Extension](#). *Journal Of Extension* 51(2):2TOT7.
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Garfin, G. 2014. “Partnerships for Managing Risk.” Presenter; invited presentation. National Council on Science and the Environment, Annual Conference. January 29, 2014.

Garfin, G. 2014. “Projections of Climate and Water-Related Variables for the Southwest U.S.” Presenter; invited presentation. Arizona Hydrological Society. February 11, 2014. Tucson, AZ.

Garfin, G. 2014. “Insights on Climate Change in the Southwest United States.” Presenter; invited presentation. National Climate change Preach-In. February 15, 2014.

Garfin, G. 2014. “What's Climate got to do, got to do with it?” Presenter; invited presentation. Confluence Center Show & Tell. March 12, 2014. Tucson, AZ.

Garfin, G. 2014. “Southwest Climate Change Impacts.” Presenter; invited presentation. Tucson Festival of Books - Panel on Impacts of Climate Change. March 15, 2014. Tucson, AZ.

Garfin, G. 2014. “Assessment of Climate Change in the Southwest United States.” Presenter; invited presentation. Tucson Festival of Books - Panel on Southwest Climate Change. March 16, 2014. Tucson, AZ.

Garfin, G. 2014. “Applying User-defined Extreme Heat Thresholds for Urban Climate Change Projections: Case Study - Tucson, AZ.” Presenter; invited presentation. EPA Climate Ready Water Utilities Webinar. March 19, 2014.

Garfin, G. 2014. “National Climate Assessment Insights for the Southwest.” Presenter; invited presentation. American Water Works Association Sustainable Water Management Conference. April 1, 2014.

Garfin, G. 2014. “Climate Change in the Southwest United States”. Presenter; invited presentation. Sabino Canyon Naturalists. April 3, 2014.

Garfin, G. 2014. “Climate Change and Sustainability in the Southwest United States.” Presenter; invited presentation. University of Arizona Solar Cats Green Talk. April 16, 2014.

Garfin, G. 2014. “Climate Change in Tucson and the Southwest United States.” Presenter; invited presentation. Progressive Democrats of Arizona. April 24, 2014.

Garfin, G. 2014. “Drought Impacts. Presenter; invited presentation.” USGS Climate and Land Use Change Group (Webinar). April 30, 2014.

Garfin, G. 2014. “Third National Climate Assessment: Climate Change Impacts in the United States”. Presenter; invited presentation. National Climate Assessment Panel Discussion. May 8, 2014. Tucson, AZ.

Pineda-Pablos, N. 2014. Panelista del “Panel-Taller de Especialistas para Analizar Propuestas de Mejora Institucional para la Gestión del Agua”, evento organizado por El COLEF, IMTA y CONAGUA, en el Centro de Capacitación del Instituto Mexicano de Tecnología del Agua (IMTA), 7 de febrero 2014.

Pineda-Pablos, N. 2014. Ponencia “La frontera y el desarrollo institucional como factores del buen desempeño del servicio de agua potable y saneamiento en Tijuana” en el Tercer Congreso de la Red de Investigadores Sociales Sobre el Agua, Salvatierra, Guanajuato, 9 al 11 abril, 2014.

Pineda-Pablos, N. 2014. Instructor del Diplomado “Ciudadanía, Democracia y Cambio Social”, con el tema *La democracia moderna y su diseño institucional*, evento organizado por el

Programa Institucional de Educación Continua de la Universidad de Sonora, 1 de marzo del 2014.

Pineda-Pablos, N. 2014. Ponencia “*La colonización civil española y los nombres de las familias en Sonora*” en la The 19th Annual International Conference of the Anza Society, Banámichi, Sonora, México, del 6 al 9 de marzo de 2014.

Varady, R. G. 2014. Transboundary groundwater governance in the U.S.-Mexico border region. To be presented at workshop, “An Uncommon Dialogue.” Organized by Bill Lane Center for American West, Stanford University. Palo Alto, CA. 2-3 June 2014.

Varady, R. G. 2014. Nexus in a transboundary context: Exploring the impacts on water security, how strategies also contribute towards climate change mitigation and adaptation, To be presented at workshop, “Water-Energy-Food Nexus – A strategy for future water security?” Organized by GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). Mexico City. 22 May 2014.

Varady, R. G., and C. A. Scott. 2014. Strengthening transboundary water security: Adaptive management to reduce climate-change vulnerability. Presented (via Skype) at MWAR-LAC (Managing Water Resources in Arid and Semiarid Zones of Latin America) Coordination Meeting, “Addressing Water Security: Climate Impacts and Adaptation Responses in Latin America and the Caribbean.” Montevideo, Uruguay. 4 Feb.

Megdal, S. B., A. K Gerlak, **R. G. Varady**, and Huang, Y. L. 2014. Groundwater management and governance: A policy perspective. To be presented (by Y.-L. Huang) at 2014 NGWA (National Ground Water Assoc.) Groundwater Summit. Denver, CO. 4-7 May. Also (by S. Megdal) at 2014 Annual UCOWR-NIWR-CUAHSI Conference, “Water Systems, Science, and Society Under Global Change.” Tufts Univ., Medford, MA. 18-20 June.

Varady, R. G., C. A. Scott, and M. Wilder. 2014. Transboundary climate change adaptation under drought in the Americas. Presented (by R. Varady) at International Conference on Cooperation for Water, Energy, and Food Security in Transboundary Basins in a Changing Climate. Ho Chi Minh City, Viet Nam, 2-3 Apr.

Wilder, M. 2014. Water Governance at the U.S.-Mexico Border: Geopolitical Ecologies of Shared Water, Shared Scarcity. Latin American, Caribbean, and Iberian Studies Center (LACIS) and Human Rights Program Series, University of Wisconsin-Madison, 21 February 2014.

Wilder, M. 2014. Water Governance at the U.S.-Mexico Border: Geopolitical Ecologies of Shared Water, Shared Scarcity. Center for Latin American & Caribbean Studies & School of Freshwater Sciences, University of Wisconsin-Milwaukee, 20 February 2014.

Wilder, M. 2014. Invited Panelist. Development Geographies: Scales, Directions, Visions. Association of American Geographers’ Annual Meeting, April 11, 2014, Tampa. Florida.

Wilder, M. 2014. Climate Vulnerability, Low-Income Communities, and Environmental Justice at the U.S.-Mexico Border. Paper presented at the Association of American Geographers’ Annual Meeting. April 11, 2014. Tampa, Florida.

2013

Garfin, G., C. Carrillo, S. Petersen, S. Reeder, and L. Ethen. 2013. “[Projected Temperature and Precipitation Extremes for Tucson, Arizona: Using Stakeholder-Defined Criteria for Adaptation Planning](#).” American Meteorological Society 93rd Annual Meeting. Austin, TX, January 8, 2013.

Garfin, G., A. Quijada, M. Wilder, and R. Varady. 2013. "[Transborder Climate and Experiments in Climate Communication: Building a Foundation for Adaptation](#)." American Meteorological Society 93rd Annual Meeting. Session on Climate Adaptation and RISA Activities. 8th Symposium on Policy and Socioeconomic Research. Austin, TX, January 8, 2013.

Garfin, G. 2013. "Southwest Region." [Symposium 9. Climate Change, Communities, and Risk: Research from the US Global Change Research Program and National Climate Assessment](#). National Council on Science and the Environment, National Conference: Disasters and Environment: Science, Preparedness, and Resilience, January 15-17, 2013.

Garfin, G. 2013. "Regional Overview." Town Hall Meeting on Sustained Climate Assessment in the Southwest, January 18, 2013, La Jolla, CA.

Garfin, G. 2013. "Assessment of Climate Change in the Southwest United States: Key Findings." Society for Range Management Annual Meeting, February 3-7, 2013, Oklahoma City, OK.

Garfin, G. 2013. "Key Findings from "The Assessment of Climate Change in the Southwest United States." CLIMAS Colloquium. February 8, 2013. Tucson, AZ.

Garfin, G. 2013. "Regional Climate Change: The Known, The Unknown, The Uncertain." Southwest Climate Change Initiative-Fire Learning Network Webinars. February, 19 and February 26, 2013.

Garfin, G. 2013. "Climate Projections and Results from Two New Reports: Assessment of Climate Change in the Southwest U.S., and National Climate Assessment, Chapter 20 – Southwest." Society of American Foresters, Southwest Chapter, Technical Session: Fire, Climate and Restoration along the Borderlands, February 22, 2013, Willcox, AZ.

Garfin, G. 2013. "Southwest Ecosystem Changes." Union of Concerned Scientists' National Climate Assessment Webinar, February 28, 2013.

Garfin, G. 2013. "Water." Ground|Water book presentation, at Tucson Festival of Books, March 9, 2013, Tucson, AZ.

Garfin, G. 2013. "Climate Change and Tucson: Sustainable City or Ghost Town?" Democrats of Greater Tucson, March 11, 2013, Tucson, AZ.

Garfin, G. 2013. "Southwest Chapter Overview." National Climate Assessment Town Hall, April 1, 2013, Tempe, AZ.

Garfin, G. and S. Petersen. 2013. "Science for Adaptation: Tucson, AZ." National Adaptation Forum, session entitled "Critical Thresholds: Can't live with them, can't live without them," April 2-4, 2013, Denver, CO.

Garfin, G. 2013. "Southwest Chapter." NCA Panel at the National Adaptation Forum, April 2-4, 2013, Denver, CO.

Garfin, G. 2013. "Projected Climate Changes for the United States: Key Findings." National Native Seed Conference, April 9, 2013, Santa Fe, NM.

Garfin, G., M. Cross, P. McCarthy, D. Gori, C. Enquist, B. Neely, J. DeGiorgio, E. Smith, and A. Bradley. 2013. Confronting Uncertainty in Planning for Adaptation to a Changing Climate. Climate Prediction and Applications Science Workshop, April 24-25, 2013, Logan, UT.

Garfin, G. 2013. "[Climate Change in the Tucson Region: Sustainable Living or Abandoned Wasteland?](#)" Book Release Event for *Assessment of Climate Change in the Southwest United States*, May 2, 2013, Tucson, AZ.

Garfin, G. 2013. "Remarks on Climate Communication with Natural Resource Managers." Water for Food Conference, "Too Hot, Too Wet, Too Dry: Building Resilient Agroecosystems," panel on Climate Communication, May 5-8, 2013, Lincoln, NE.

Garfin, G. 2013. "Adaptive Urban Water Management." Session moderator; Breakout group facilitator. Western Adaptation Alliance, Climate Leadership Training. June 3-5, 2013. Phoenix, AZ.

Garfin, G. 2013. "Assessment of Climate Change in the Southwest United States: Key Findings." Keynote presenter (invited). Science on the Sonoita Plain Symposium. June 8, 2013. Elgin, AZ.

Garfin, G. 2013. "Assessment of Climate Change in the Southwest United States: Key Findings." Presenter; invited presentation. NASA/Arizona-Sonora Desert Museum Earth Camp Teachers' Professional Development Workshop. June 10, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate and Environmental Challenges in the Southwest - for the SHUTTLE Route." Presenter; invited presentation. SHUTTLE (Art-Environment Collaborative Event). June 17, 2013. Tucson, AZ.

Garfin, G. 2013. "Assessment of Climate Change in the Southwest United States: Key Findings." Presenter; invited presentation. Pima Association of Governments, Air Quality Forum. June 18, 2013. Tucson, AZ.

Garfin, G. 2013. "Is Climate Change Turning Tucson into Yuma: How Climate Change Will Affect Southern Arizona." Presenter; invited presentation. Arizona Senior Academy. June 26, 2013. Vail, AZ.

Garfin, G. 2013. "U.S. CLIVAR Applications and Engagement Strategy." Presenter; invited presentation. U.S. CLIVAR Annual Summit. July 10, 2013. Annapolis, MD.

Garfin, G.2013. “Assessment of Climate Change in the Southwest United States: Implications for the San Pedro.” Presenter; invited presentation. San Pedro Riparian NCA Educational Forum. July 27, 2013. Sierra Vista, AZ.

Garfin, G.2013. “Climate Change in the Southwest United States.” Presenter; invited presentation. Drinking Liberally. July 31, 2013. Tucson, AZ.

Garfin, G.2013. “Climate Change Implications for Tucson.” Panelist (invited). Access Tucson Television Show. August 1, 2013. Tucson, AZ.

Garfin, G.2013. “Importance of Information Transfer and Facilitating Effective Dialogue.” Presenter; invited presentation. 98th Annual Meeting, Ecological Society of America. August 9, 2013. Minneapolis, MN.

Garfin, G.2013. “CLIMAS Overview: 15 years in 15 minutes.” Presenter; invited presentation. Interagency Transportation Land Use, and Climate Change Scenario Planning, U.S Department of Transportation. Webinar. August 15, 2013. Albuquerque, NM

Garfin, G.2013. “Projected Climate Changes for the United States: Key Findings.” Presenter; invited presentation. Continuing Legal Education. August 22 – 23, 2013. Reno, NV.

Garfin, G.2013. “Assessment of Climate Change in the Southwest United States: Key Findings.” Presenter; invited presentation at Pima Association of Governments, Environmental Planning Advisory Committee. September 6, 2013. Tucson, AZ.

Garfin, G.2013. “Overview of Findings from Assessment of Climate Change in the Southwest United States: Focus on Extremes.” Lead Organizer; Presenter. Biennial Conference of Science and Management on the Colorado Plateau. September 17-18, 2013. Flagstaff, AZ.

Garfin, G.2013. “Climate Change in the Southwest United States.” Presenter; invited presentation. Maricopa Bar Association (Continuing Legal Education) September 18, 2013. Phoenix, AZ.

Garfin, G.2013. “Assessment of Climate Change in the Southwest United States: Key Findings.” Presenter; Submitted presentation. 26th Annual Arizona Hydrological Society Symposium. September 20, 2013. Tucson, AZ.

Garfin, G.2013. “Overview of Climate Change and its Impacts in the Southwest United States.” Co-Organizer; Presenter. Climate Ready Southwest: Ready or Hot? September 21, 2013. Tucson, AZ.

Garfin, G.2013. “Climate Change in the Southwest United States.” Presenter; invited presentation. Free Thought Arizona. September 22, 2013. Tucson, AZ.

Garfin, G.2013. “Desert Water: Paradoxes and Trade-Offs.” Panelist (invited). Water: Where Science and Art Meet; Confluence Center. September 24, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate Change in the Southwest United States." Presenter; invited presentation. Southern Arizona Environmental Management Society. September 25, 2013. Tucson, AZ.

Garfin, G. 2013. "Desert Water: Paradoxes and Trade-Offs." Presenter; invited presentation. Ground | Water at Antigone's Books. September 27, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate Change in the United States: Cooperative Extension & Sustainability." Co-organizer; Presenter; Breakout group facilitator. Extension Sustainability Summit. October 2-3, 2013. Park City, UT.

Garfin, G. 2013. "Assessment of Climate Change in the Southwest United States." Presenter; invited presentation. Climate Science and Solutions Professional Masters Program. Northern Arizona University. October 9, 2013. Flagstaff, AZ.

Garfin, G. 2013. "Climate Change in the Southwest United States." Presenter; invited presentation. Huachuca Audubon Society. October 15, 2013. Sierra Vista, AZ.

Garfin, G. 2013. "Climate Change and its Impacts in the Southwest United States." Presenter; invited presentation. Pima County Health Department. Strategic Warriors Against Transmission. October 17, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate Change in the Southwest United States. Presenter; invited presentation. WESTCAS - Western Coalition of Arid States. October 31, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate Change in the Southwest United States." Presenter; invited presentation. Sampler of International Learning in Retirement - Sun City Vistoso. October 31, 2013. Oro Valley, AZ.

Garfin, G. 2013. "Ethical and Religious Implications of Climate Change." Presenter; invited presentation. University Religious Council. November 6, 2013. Tucson, AZ.

Garfin, G. 2013. "Science Perspective: Climate Projections for the Southwest." Presenter; invited presentation. Regional Climate Summit for Municipal Leaders: Economic. Health, Water & Transportation Impacts. November 14, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate and Hydrology." Presenter; invited presentation. Gila River Ecological Flows Project Team Meeting. November 18, 2013. Albuquerque, NM.

Garfin, G. 2013. "Climate Change in the Southwest United States." Presenter; invited presentation. Tucson Electric Power and UNISOURCE Integrated Resources Plan Workshop. November 22, 2013. Tucson, AZ.

Garfin, G. 2013. "Institute of the Environment, University of Arizona Resources and the Environment of the Southwest." Presenter; invited presentation. Desert Discovery Center UA-Developers Meeting. December 2, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate Change in the Southwest United States." Presenter; invited presentation. Arizona-Sonora Desert Museum Docent Climate Training. December 4, 2013. Tucson, AZ.

Garfin, G. 2013. "Climate in Context." Session facilitator. RISA Meeting. December 5, 2013. La Jolla, CA.

Garfin, G. 2013. "Cooperation on Climate Services in the Binational Rio Grande/Bravo Basin." Poster presentation. AGU Fall Meeting. December 9, 2013. San Francisco, CA.

Garfin, G. 2013. "Going the Extra Mile: Making Climate Data and Information Usable for Decision Making." Presenter; invited presentation. AGU Fall Meeting. December 12, 2013. San Francisco, CA.

Garfin, G. 2013. "The Adaptation for Conservation Targets (ACT) Adaptation Framework." Co-organizer; Presenter. BLM Scenario Planning meeting, online orientation. December 17, 2013.

Megdal, S. B., **R. G. Varady**, and A. K. Gerlak. 2013. Groundwater governance in a federal framework: Results of a survey of the 50 states of the USA. Presented (by S. Megdal) at Fifth Regional Consultation. GEF Project "Groundwater Governance." The Hague, Neth. 20 Mar. (invited).

Megdal, S. B., A. K. Gerlak, and **R. G. Varady**. 2013. Groundwater management: a policy perspective. Presented (by S. Megdal) at the Groundwater Protection Council Annual Forum, "Groundwater Protection: Reflecting Progress & Responding to the Future." St. Louis, MO. 23 Sept.

Megdal, S. B., A. K. Gerlak, and **R. G. Varady**. 2013. Groundwater governance in the U.S.: Results of a survey of the 50 states. Presented (by S. Megdal) at the AWRA (American Water Resources Assoc.) Annual Water Resources Conference. Portland, OR. 5 Nov.

Pineda-Pablos, N. 2013. Comentarista en la Mesa de Dialogo "Planeación y uso de los recursos hidráulicos en el noroeste de México" Ponente Ing. Arsenio Cienfuegos Domínguez, evento organizado por la Universidad de Sonora y el Seminario de Cultura Mexicana, Hermosillo, Sonora, 14 de febrero de 2013.

Pineda-Pablos, N. 2013. Ponencia "El impacto de la intervención del gobierno y del arreglo institucional de los usuarios en el agotamiento del acuífero de la Costa de Hermosillo" en el 1er. Congreso de Investigación Instituciones, Gobierno y Sociedad Civil, evento organizado por El Colegio de Sonora, Hermosillo, Sonora, 13 y 14 de mayo de 2013

Pineda-Pablos, N. 2013. “Agua, historia y sociedad en Sonora. Apuntes sobre el pasado y el presente de una región semiárida” Presentation at “el VI Coloquio de Historia Regional 2013,” organizado por la comunidad estudiantil del Departamento de Historia y Antropología, Universidad de Sonora, 5 al 8 de noviembre de 2013.

Pineda-Pablos, N. 2013. Seminar organizer. “Pasado y presente de la política pública” impartido por el Dr. Luis F. Aguilar V. de la Universidad de Guadalajara, en El Colegio de Sonora, Hermosillo, Sonora, 27 de febrero de 2013.

Pineda-Pablos, N. 2013. Presentador de la Conferencia Magistral “El futuro de la evaluación de las políticas públicas en México” dictada por el Dr. Manuel Perló Cohen de la UNAM en el 1er. Congreso de Investigación Instituciones, Gobierno y Sociedad Civil, evento organizado por El Colegio de Sonora, Hermosillo, Sonora, 13 y 14 de mayo 2013.

Pineda-Pablos, N. 2013.. Moderador en la mesa “Análisis y evaluación de políticas públicas” en el 1er. Congreso de Investigación Instituciones, Gobierno y Sociedad Civil, evento organizado por El Colegio de Sonora, Hermosillo, Sonora, 13 y 14 de mayo 2013.

Pineda-Pablos, N. and J. L. Moreno. 2013. The government and users organization impact on the depletion in the Costa de Hermosillo aquifer in Mexico. IASC 2013. 14th. Global Conference of the International Association for the Study of the Commons, Mt. Fuji, Japan, June 3-7, 2013.

Pineda-Pablos, N. 2013. Ponente en el Primer Foro Estatal sobre Participación Ciudadana, evento organizado por el consejo Estatal Electoral y de Participación Ciudadana (CEE), el día 27 de junio de 2013.

Pineda-Pablos, N. 2013.. Expositor en el Seminario General de Investigación, con el trabajo “Derechos de agua y gestión por cuencas en México. El caso del río Sonora”, en colaboración con Alejandro Salazar Adams y José Luis Moreno Vázquez, evento organizado por la Dirección General Académica de El COLSON, 11 de septiembre 2013.

Pineda-Pablos, N. 2013. Moderador en el Foro “Derecho humano al agua; Implicaciones para la planificación y la gestión del agua”, evento organizado por la CONAGUA y la UNESCO, 30 de octubre de 2013.

Pineda-Pablos, N. 2013. Comentarista en la Presentación del libro “Por el milagro de aferrarse. Tierra y vecindad en el Valle de Yaqui” de Mayo Murrieta y María Eugenia Graf, en El Colegio de Sonora, 14 de noviembre de 2013.

Scott, C.A. 2013. Diálogo entre ciencia y política para la seguridad hídrica (Science-policy dialogues for water security). Ciencia y toma de decisiones para la adaptación al cambio climático (Science and decision-making for climate-change adaptation), Santiago, Chile, July 4, 2013.

Scott, C.A. 2013. Fortalecimiento de la resiliencia de corredores riparios (Strengthening riparian-corridor resilience), Universidad Nacional Mayor de San Marcos, Lima, Peru, April 26, 2013.

Scott, C.A. 2013. Strengthening resilience of riparian-corridor coupled natural-human systems, Towards socio-hydrologic synthesis: modeling the co-evolutionary dynamics of coupled human, water, and ecological systems, National Socio-Environmental Synthesis Center (SESYNC), Annapolis, Maryland, December 13-16, 2013.

Scott, C.A. 2013. The Water-energy-food nexus: Adaptive capacity to complex global challenges. Position paper presented at Workshop on Nexus of Water, Soil and Waste, United Nations University, Dresden, Germany, November 11-12, 2013.

Scott, C.A. 2013. Seguridad hídrica y adaptación al cambio climático en zonas áridas (Water security and climate-change adaptation in arid regions), Cuarto Seminario Internacional de Potamología (Fourth International Potamology Seminar), Jiutepec, Mexico, October 24-15, 2013.

Scott, C.A. 2013. Understanding coupled human-water systems, Advancing Socio-hydrology: A New Science of People and Water, Beckman Institute, University of Illinois - Urbana Champaign, August 28-30, 2013.

Scott, C.A. 2013. (Keynote) Perspectivas y escenarios de uso de agua en zonas áridas. Ofertas conocidas y demandas previstas (Perspectives and scenarios for water use in arid regions under variable supply and increasing demand), Primer Encuentro Internacional - Agua, Productividad y Desarrollo Económico (First International Symposium – Water, Productivity, and Economic Development), Mendoza, Argentina, June 5-6, 2013.

Scott, C.A. 2013. Innovative science and influential policy dialogues for water security in the arid Americas, University of the West of England and Lloyds Register Foundation, London, UK, May 20-22, 2013.

Scott, C.A. 2013. Mapeo de actores y análisis institucional (Actor mapping and institutional analysis), Vulnerabilidad y adaptación a la variabilidad y al cambio climático en la Cuenca del Río Maipo en Chile Central (Vulnerability and adaptation to climate variability and change in the Maipo Basin, Central Chile), Isla del Maipo, Chile, April 25, 2013.

Varady, R. G. 2013. Israeli-Palestinian, Colorado River, and transboundary water-management challenges. Presented at Postgraduate Seminar Series and Advanced Masters Course on International Development and Social Cohesion. Univ. of Luxembourg. Luxembourg, 15 Mar.

Varady, R. G., and S. B. Megdal. 2013. Global groundwater policy and governance. Presented (by R. Varady) at Fifth Regional Consultation: Europe, Central Asia and North America (UNECE region). GEF Project “Groundwater Governance: A Global Framework for Country Action” (FAO, GEF, IAH, UNESCO-IHP, WB). The Hague, Netherlands. 19 Mar. (invited).

Varady, R. G. 2013. Water cooperation builds peace? A historical perspective. Presented at thematic session, “Water Cooperation Builds Peace” at World Water Day. The Hague, The Netherlands. 22 Mar.

Varady, R. G. 2013. Antecedentes y contexto de la investigación sobre el agua y clima en la región occidental de la frontera México y Estados Unidos de Norteamérica (Background and context of climate-related research in the western U.S.-Mexico border region). Presented at “Taller sobre Cambio Climático: Temática de Sequía Regional y Foro con Investigadores Internacionales,” en el Marco de PRONACOSE. CONAGUA. México, D.F. 10 Dec.

2012

(Note: Adaptation Futures Conference was an international conference held in Tucson in 2012).

Correia, J., S. Kelly, H. Bruckner, S. Marley, M. Wilder, G. Garfin, R. G. Varady, and M. Vásquez-León. 2012. New directions in adaptive capacity and resilience in arid regions. Presented (by J. Correia) at “Adaptation Futures” Conference. Tucson, AZ. 29-31 May.

Garfin, G.M., C. Carrillo, 2012. Climate Variability and Change: Projections for the Southwest, the Colorado River Basin, and Tucson. Presented at City of Tucson Climate Change Committee Meeting. January 2012, Tucson, AZ.

Garfin, G.M., A. Quijada-Mascareñas, 2012. Transborder Climate and Experiments in Climate Communication: Building a Foundation for Adaptation. Third Conference on Biodiversity and Management of the Madrean Archipelago. May 2, 2012, Tucson, Arizona.

Garfin, G.M., C. A. Scott, M. Wilder, R. Varady, N. Pineda, J. McEvoy, R. Díaz-Caravantes, A. Browning-Aiken, 2012. Building capacity for adaptation to climate change in arid North America at the nexus between water, energy and environment. Poster presented at Adaptation Futures Conference. Tucson, AZ. 29-31 May.

Garfin, G.M. 2012. *Spatial Resolution in Adaptation Planning: What Would the Impressionists Say? Panel on The Spatial Resolution of Climate Information for Adaptation: What Do We Really Need? Adaptation Futures Conference. May 2012, Tucson, AZ.*

Garfin, G.M. 2012. Tucson, Arizona. Panel on *Getting the Job Done: How Western U.S. Cities are Adapting to Climate Change. Adaptation Futures Conference. May 2012, Tucson, AZ.*

Garfin, G.M. 2012. *Climate Change and Watersheds: Challenges, Responses, and Planning. International Seminar on Watershed Management, USDA-Forest Service International Programs. April 2012, Tucson, AZ.*

Garfin, G.M. 2012. Climate Variability and Change: Projections for the Southwest, the Colorado River Basin, and Tucson. Power to Prepare Tucson. March 2012, Tucson, AZ.

Lipnick C., P. Robles, **D. Austin,** and F. Trujillo. *Composting Toilets in the Santa Cruz Watershed.* Presented at Santa Cruz River Symposium in Tucson in conjunction with the "Biodiversity and Management of the Madrean Archipelago III: Merging Science and Management in a Rapidly Changing World" conference. May 2, 2012.

Megdal, S. B., A. Aureli, F. van Weert, and **R. G. Varady**. 2012. The Global Groundwater Governance Project: Developing a framework for good groundwater governance. To be presented (by S. Megdal) at the 2012 “Drylands, Deserts and Desertification” Conference. The Ben Gurion University, Sde Boqer, Israel. 12-15 Nov.

Pineda Pablos, N. 2012. Vulnerabilidad institucional y crisis de la gestión del agua en Hermosillo, Sonora. Paper presented in 2do. Congreso de la Red de Investigadores Sociales sobre el Agua (Red-ISSA), Centro Universitario de Ciencias Sociales y Humanidades, Universidad De Guadalajara, Chapala, Jal., México. 21 - 23 March.

Quijada-Mascareñas, A., 2012. Transborder Climate Newsletter and Webinars. Presented at “A workshop on strategy for the reduction of meteorological risk in civil protection based on weather and climate information.” Mexico City, April 25-27, 2012. Organized by the Instituto de Geografía, Universidad Nacional Autónoma de México (UNAM).

Reeder, S., **G. Garfin**, L. Ethen, and C. Carrillo. 2012. *The City of Tucson Climate Adaptation Project: Using Stakeholder Defined Criteria to Shape Climate Data Products. Adaptation Futures Conference. May 2012, Tucson, AZ.*

Scott, C. A. 2012. Water-energy nexus: institutions and policy, Anticipatory R&D Investments for Energy-Water-Climate Change in Arid Regions. University of Arizona and Sandia National Laboratories, Tucson, February 21, 2012.

Scott, C. A. 2012. Seguridad hídrica y manejo adaptativo en las regiones áridas de América, Seminario Lanzamiento Centro AQUASEC sobre Seguridad Hídrica en las Américas, Pontificia Universidad Católica, Santiago, Chile, March 13, 2012.

Scott, C. A., M. Wilder, R. Varady, N. Pineda, J. McEvoy, R. Díaz-Caravantes, and A. Browning-Aiken. 2012. Building capacity for adaptation to climate change in arid North America at the nexus between water, energy and environment. Poster presented at “Adaptation Futures” Conference. Tucson, AZ. May 29-31, 2012.

Scott, C. A. 2012. Climate-ready water and wastewater infrastructures: resilience under changing climate, regional water supply uncertainty, and variable demand in southern Arizona, Adaptation Futures International Conference on Climate Adaptation, Tucson, May 29-31, 2012.

Varady, R. G., C. A. Scott, M. Wilder, and G. Garfin. 2012. Building a path to AQUASEC: Regional antecedents and precursors to a continent-wide science-policy network. Presented (by G. Garfin) at “Adaptation Futures” Conference. Tucson, AZ. 29-31 May.

Varady, R. G., S. B. Megdal, and S. Eden. 2012. Shared borders, shared waters: Israeli-Palestinian and Colorado River water challenges. Presented (by R. Varady) at Seminario Internacional "Agua y Fronteras ante el Cambio Climático,” org. by El Colegio de la Frontera Norte (COLEF) and El Centro de Investigaciones y Estudios Superiores en Antropología Social (CIESAS). Monterrey, N.L., Mexico. 26 Oct.

Varady, R. G., F. van Weert, S. B. Megdal, A. Gerlak, C. Abdalla Iskandar, and L. House-Peters. 2012. Groundwater policy and governance: The GEF project on global groundwater governance. Presented (by Varady) at Seminario Lanzamiento Centro AQUASEC Sobre Seguridad Hídrica en las Américas (Seminar on the Launch of the AQUASEC Center on Water Security in the Americas). Centro de Cambio Global, Pontificia Universidad Católica de Chile. Santiago, Chile. 13 March 2012.

Vásquez-León, M. 2012 “Collaborative governance and building adaptive capacity in the Colorado River Delta/Upper Gulf of California”. Adaptation Futures Conference. May 29-31st. Tucson, AZ.

Vásquez-León, M. 2012. Invited as one of eight Lead Authors for the technical input document, *Rural Communities Technical Workshop Report*, for the *Rural Communities* chapter of the 2013 National Climate Assessment report.

Vásquez-León, M. 2012. Group Leader and Moderator . Rural Communities Technical Workshop. National Climate Assessment. Charleston, NC.

Wilder, M., G. Garfin, N. Pineda-Pablos, R. G. Varady, C. Scott, M. Vásquez-León, J. Correia, S. Kelly, H. Bruckner, A. Quijada, and S. Marley. 2012. Building adaptive capacity for water management in the U.S.-Mexico border region: scientist-stakeholder collaboration to achieve socioecological resilience. Presented (by **M. Wilder**) at International Human Dimensions program (IHDP) “Planet Under Pressure 2012: New Knowledge Towards Solutions” Conference. London, U.K. 28 Mar.

Wilder, M., I. Aguilar Barajas, J. McEvoy, **R. G. Varady,** S. B. Megdal, **C. A. Scott,** and **N. Pineda.** 2012. Desalination technology in a binational context: Systemic implications for water, energy, and environment in the Arizona-Sonora portion of the U.S.-Mexico border. Presented by **M.**

Wilder and I. Aguilar Barajas at the Puentes Consortium Mexico-U.S. Higher Education Leadership Forum. Houston, TX. 26 April (inv.).

Wilder, M., R. G. Varady, J. Correia, and S. Kelly. 2012. Unpacking the adaptation deficit: Key indicators of capacity-building in water management in the U.S.-Mexico border region. Presented (by **M. Wilder**) at “Adaptation Futures” Conference. Tucson, AZ. 29-31 May.

Wilder M., 2012. Overview of Impacts of Climate Change on U.S.-Mexico Border Region. Perspectives from Ground Zero: Overview of the National Climate Assessment Southwest Region Technical Report. Adaptation Futures Conference, University of Arizona, May 31, 2012. Panelist.

Wilder M., 2012. AQUASEC Launch: Water Security in the Arid Americas. Adaptation Futures Conference, University of Arizona, May 29, 2012. Discussant.

Wilder M., G. Garfin, N. Pineda Pablos, R. Varady, C.A. Scott, M. Vásquez-León, J. Correia, S. Kelly, H. Bruckner, A. Quijada, and S. Marley, 2012. Building Adaptive Capacity

for Water Management in the U.S.-Mexico Border Region: Scientist-Stakeholder Collaboration To Achieve Socioecological Resilience. International Human Dimensions Program (IHDP) Planet Under Pressure Conference, March 28, 2012. London. Juried acceptance of paper.

2011

Garfin G. M., 2011. Regional Climate Change Projections for Southern Arizona and the Colorado River Basin. Presented at “Climate Change and the City of Tucson’s Greater Southlands Habitat Conservation Plan: Climate Projections and Habitat Workshop,” Panel on Regional climate change projections for the next 70-plus years. October 2011, Tucson, AZ.

Garfin, G., C. A. Scott, M. Wilder, R. Varady, N. Pineda, J. McEvoy, R. Díaz-Caravantes, and A. Browning-Aiken. 2011. Building capacity for adaptation to climate change in arid North America at the nexus between water, energy and environment. Poster presented at World Climate Research Programme Open Science Conference. Denver, CO. 25 October 2011.

Garfin G. M. and A. Quijada-Mascareñas, 2011. Developing Innovations in Communicating Climate Science. Project Launch Workshop, Managing Demand and Rethinking Supply: Adaptation, Conservation, and Planning in the Drought-prone Southwestern United States and Northwest Mexico. October 2011, Tucson, AZ.

Megdal, S. B., A. Aureli, and **R. G. Varady.** 2012. Developing a framework for groundwater governance. Presented (by. S. Megdal) at "Drylands, Deserts and Desertification Conf." Sede Boqer, Israel. 12 Nov.

Pineda-Pablos N., 2011. Agua Urbana (relación entre sector hídrico y otros sectores). *Workshop on climate risk and water security in the Americas*. Los Cabos, Baja California Sur, March 1, 2011.

Pineda-Pablos N., 2011. Seminario General de Investigación Vivienda Precaria y grupos vulnerables al clima en la ciudad de Hermosillo, Sonora: Un estudio exploratorio. El Colegio de Sonora, Hermosillo, Sonora, May 25, 2011.

Pineda-Pablos N. and A. Salazar-Adams, 2011. Prospective scenarios for water management in Mexican cities”. Ponencia en *IWA International Conference. Cities of the future Xi'an-Technologies for Integrated Urban Water Management*. Xi'an, China, Sept. 15-19, 2011.

Pineda-Pablos N. and A. Salazar-Adams, 2011. ¿Crecer sin agua? Los retos de la gestión urbana del agua en México frente al crecimiento económico y el cambio climático, in A. X. Iracheta Cenecorta, M.A. García Gómez y R. Pérez Fernández, eds., *Memorias del XII seminario-taller internacional de la red mexicana de ciudades hacia la sustentabilidad*, editado. México: El Colegio Mexiquense y La Universidad de Guanajuato.

Pineda-Pablos N. and A. Salazar-Adams, 2011. Growth with no water? The challenges of urban water management in Mexican arid regions vis-à-vis economic growth and climate

change. *XIV World Water Congress*. Porto de Galinhas, Pernambuco, Brasil, September 29, 2011.

Pineda-Pablos N., M. Wilder, A. Salazar-Adams, J. L. Moreno and **C. Scott**, 2011. El manejo adaptativo del agua en ciudades en entornos áridos y semiáridos. El caso de Hermosillo. *Congreso Nacional de Investigación en Cambio Climático 2011*. México, D. F. October 17, 2011.

Pineda-Pablos N., M. Wilder, and **C. Scott**. Representación, marco institucional y gobernanza en los gobiernos locales de Hermosillo, Sonora (México) y Tucson, Arizona (E.U.A.). VII Congreso Internacional “Enfrentar la crisis y construir alternativas desde el gobierno local.” Aguascalientes, México, November 14-16, 2011.

Salazar-Adams A., and **N. Pineda-Pablos**. 2011. Prospective scenarios for water management in Mexican cities. Proceedings of IWA International Conference. Cities of the future Xi'an-Technologies for Integrated Urban Water Management. Xi'an, China: International Water Association.

Varady, R. G. 2011. Global water governance: Confronting aridity and transboundary issues. Presented at workshop, “Water: Managing a Precious Resource – Transatlantic Views.” The French-American Foundation/France and the U.S. Embassy in France. Paris, France. 23 Mar.

Varady, R. G. 2011. Historical Approaches to Water Governance and Policies: Local to Global Paradigms. Presented at Short Course on World History of Water Management. North-West University and UNESCO-IHE Institute for Water Education. Vanderbiltpark, South Africa. 30 June (invited).

Varady, R. G., C. A. Scott, and S. B. Megdal. 2011. Localizando decisiones sobre las aguas subterráneas en la Alta Cuenca del Río San Pedro de Estados Unidos y México (Localizing decisionmaking on groundwater in the U.S.-Mexico Upper San Pedro River Basin). Presented at Conference, “The Management of the Guarani Aquifer System: An Example of Cooperation.” São Paulo, Brazil. 22 Sept. (invited).

Varady, R. G., S. B. Megdal, A. Gerlak, C. Abdalla Iskandar, J. L. Martín Bordes, and F. van Weert. 2011. Groundwater Policy and Governance. Presented at Inception Meeting, GEF Groundwater Governance (GWG) Project. UNESCO IHP. Paris, France. 6 Sept. (invited).

Vásquez-León, M. 2011. Pesca al borde de la extinción: Conservación de la Vaquita en el alto Golfo de California. Foro Binacional Sobre el Desarrollo Humano Transfronterizo en la Region Sonora-Arizona. November 1st. Nogales, Sonora, Mexico.

Vásquez-León, M. 2011. “Fishing at the Edge of Extinction: Vaquita Conservation in the Gulf of California. Society for Applied Anthropology, 70th Annual Meeting. Merida, Mexico

Wilder, M., 2011. Socioeconomic Vulnerability and Water Security Challenges in the Arid Americas. AQUASEC Initiative on Water Security in the Arid Americas. San José del Cabo, February 28, 2011.

Wilder, M. 2011. Human-Environment Interactions in the U.S.-Mexico Borderlands. Association of American Geographers' Annual Meeting, Seattle, April 11-15, 2011. Invited panelist.

Wilder, M. 2011. Water, Climate & Development: Strengthening the Links Between the Sectors. Association of American Geographers' Annual Meeting, Seattle, April 11-15, 2011. Invited panelist.

Wilder, M. 2011. Transboundary Water Management: goals, challenges, and the role of collaboration. Seminar on Water and Land: governance and rights. El Colegio de Mexico, Mexico D.F. 15 June 2011. Invited speaker.

Wilder, M. 2011. Managing Demand and Rethinking Supply: Adaptation, Conservation, and Planning in the Drought-prone Southwestern United States and Northwest Mexico. Presentation at NOAA-Climate-Society Interactions (CSI) Project Launch Workshop, Institute of the Environment, University of Arizona, October 14, 2011.

Wilder, M. 2011. Cities on the Edge: Water Vulnerability and Adaptive Capacity at the U.S.-Mexico Border. Association of American Geographers' Annual Meeting, Seattle, April 16, 2011.

Wilder, M. 2011. Human-Environment Interactions in the U.S.-Mexico Borderlands. Association of American Geographers' Annual Meeting, Seattle, April 11-15, 2011. Invited panelist.

Wilder, M., 2011. Whose Water is It? Privatization and Decentralization in Mexico & Bolivia. Title VIA Directors' Meeting, Tucson, Arizona, March 4, 2011. Invited speaker.

Other participation

Garfin G. M. North American Climate Services Partnership (NACSP) – Rio Grande/Rio Bravo Pilot Project Team (Member, 2011-present).

Scott, C.A. Water security in the arid Americas: launch of AQUASEC center (session coordinator), Adaptation Futures International Conference on Climate Adaptation, Tucson, May 29-31, 2012.

Varady, R. G., Scientific Advisory Board, “Innovative Science and Influential Policy Dialogues for Water Security in the Arid Americas.” 3-year (2013-16), \$800,000 Collaborative Research Networks (CRN3) project funded by Inter-American Institute for Global Change Research (IAI).

Varady, R. G., Moderator, High-level Panel, “Opening high-level statements, and Cooperation—the key to peaceful water sharing.” And co-chair, Working Group, “Preparing

recipes for water cooperation.” Closing Ceremony, 2013 International Year of Water Cooperation. Mexico City. 5-6 Dec.

Varady, R. G., Member, International Program Committee and Drafting Committee, 2013 Budapest Water Summit, Budapest. 8-11 Oct. 2013.

Varady, R. G., Member, High-level Panel, “How to govern water wisely with SMART SDGs (Sustainable Development Goals)?” 2013 Budapest Water Summit. Budapest. 10 Oct. 2013.

Varady R. G., Member, Permanent Consultation Mechanism, GEF Groundwater Governance Project, “A global framework for country action.” Partnership of GEF, FAO, UNESCO, World Bank, IAH. 2011-14. Participated in first regional consultation in Montevideo, Uruguay. 18-20 April 2012.

Varady, R. G., International Scientific Committee, International Conference on Traditional Knowledge for Water Resources Management. UNESCO International Hydrological Programme and International Centre on Qanats and Historic Hydraulic Structures (ICQHS). Yazd, Iran. 21–23 Feb. 2012.

Varady, R. G., Introduction to the state of groundwater governance and prospects for a common vision. Inception Meeting, GEF Project on “Groundwater Governance” (FAO, GEF IW, IAH, UNESCO-IHP, WB). UNESCO Headquarters, Paris, France. 6-7 Sept. 2011.

Varady, R. G., Groundwater Policy and Governance: Ideas for a White Paper. Presented at GEF Project on “Groundwater Governance,” First Experts Meeting. UNESCO IHP. Paris, France. 29 April 2011.

Varady, R. G., Ideas for ISARM’s Vision for Good Policies and Governance. Presented at ISARM Experts Meeting, “Lessons Learnt and Ways Forward.” UNESCO IHP. Paris, France. 28 April 2011.

Varady R. G., Moderator, Session, “Governance and Management of Transboundary Waters.” XIVth International Water Resources Association (IWRA) World Water Congress. Porto de Galinhas, Brazil. 28 Sept. 2011.

Vásquez-León, M. 2012 Invited as one of eight Lead Authors for the technical input document, *Rural Communities Technical Workshop Report*, for the *Rural Communities* chapter of the 2013 National Climate Assessment report.

